

CORF notes that this rule makes no exception or distinction with respect to Channel 37. Similarly, Rule Section 73.698, which sets forth the table of so-called "UHF taboos," specifically lists Channel 37. Column 4 of the Table indicates that stations operating on Channels 36 and 38 cannot be located within 87.7 kilometers (54.5 miles) of a Channel 37 facility. Again, no exception or distinction is made with respect to Channel 37; moreover, this rule explicitly provides for adjacent channel protection of Channel 37.

Adjacent channel protection of Channel 37 is not quite as clear in Part 74 of the Rules as it is in Part 73 because Part 74 refers to protection of "TV broadcast stations" rather than UHF channels.^{2/} Nevertheless, there is no explicit indication in Part 74 that Channel 37 should be treated differently than other

^{2/} Section 74.703(b) provides:

It shall be the responsibility of the licensee of a low power TV, TV translator, or TV booster station to correct at its expense any condition of interference to the direct reception of the signal of any other TV broadcast station operating on the same channel as that used by the low power TV, TV translator, or TV booster station or an adjacent channel which occurs as a result of the operation of the low power TV, TV translator, or TV booster station.

Section 74.705(b)(1) provides:

An application to construct a new low power TV or TV translator station or to change the facilities of an existing station will not be accepted if it specifies a site which is within the protected contour of a co-channel or first adjacent channel TV broadcast station.

Section 74.705(a) specifies that the protected contour of a TV broadcast station is its Grade B contour.

UHF-TV channels. Moreover, inasmuch as full-power UHF-TV stations must afford adjacent channel protection to Channel 37, it would be incongruous for low power TV ("LPTV") stations^{2/} to afford Channel 37 users any less protection.^{10/}

Despite the Commission's apparent intention to afford radio astronomy installations utilizing Channel 37 the same degree of adjacent channel protection as UHF-TV stations, full-power UHF-TV stations on Channels 36 and 38 have been authorized within about the 50 to 60 mile range of radio astronomy installations using Channel 37.^{11/} For example, Tele 38, Inc. is licensed to operate WJWN-TV on Channel 38 at a location in San Sebastian,

^{2/} CORF refers to LPTV stations throughout this Petition rather than to auxiliary broadcast stations in general (i.e., LPTV, translators and boosters) because LPTV stations are more prevalent and, therefore, pose a greater potential for interference. Nevertheless, the rule changes proposed herein should be equally applicable to translator and booster stations.

^{10/} Since protection of adjacent channel TV stations under Part 74 is expressed in terms of their Grade B contour rather than mileage separation and since radio astronomy observatories do not have Grade B contours, amendment of Part 74 is necessary in order to implement the adjacent channel protection to which Channel 37 radio astronomy operations are entitled.

^{11/} According to the Table of Allotments, there are a total of sixteen Channel 36 or 38 allotments (seven commercial and nine non-commercial allotments) in the eight states and two U.S. territories in which the twelve subject radio astronomy sites are located. Of these sixteen allotments, half are vacant (two commercial and six non-commercial). Television & Cable Factbook, 1992 Edition, Stations Volume No. 60 (containing data updated to Oct. 1, 1991). One of these vacant non-commercial allotments, Channel 36 in Davenport, Iowa, is within about 60 miles of the VLBA site at North Liberty, Iowa. Another vacant non-commercial allotment, Channel 38 at Hilo, Hawaii, is within about 25 miles of the VLBA site at Hilo, Hawaii. Because of the proximity of the Hilo allotment to this site, CORF seeks to delete it from the Table of Allotments.

Puerto Rico, that is only about 30 miles from the Arecibo Observatory.

LPTV stations on Channels 36 and 38 have also been authorized close enough to radio astronomy sites using Channel 37 to create potential interference problems.^{12/} In fact, the interference threat posed by LPTV stations operating on Channel 36 or 38 is actually more pervasive than the threat posed by full-power stations because such LPTV stations can be authorized anywhere.

There appears to be a simple explanation for why radio astronomy sites utilizing Channel 37 have not been afforded the degree of adjacent channel protection to which they are entitled--neither broadcasters nor the Commission knows where all thirteen of these radio astronomy sites are located. Unlike a UHF-TV channel, which is allotted to a specific community in the Table of Allotments or a particular UHF station whose specific channel assignment is reflected in Commission records and commercially available data bases, the locations where Channel 37

^{12/} The following are some examples of LPTV stations on Channels 36 or 38 that have been authorized within about the 50 to 60 mile range of radio astronomy installations using Channel 37: (1) R.B. Sheldahl was authorized to construct an LPTV station on Channel 36 (K36CF) at a location in Iowa City, Iowa, that is only about six miles from the North Liberty, Iowa, VLBA site, but filed an application on February 12, 1992 to modify its construction permit to change to Channel 23; (2) Le Sea Broadcasting was authorized to construct a translator station on Channel 36 (K36CT) at a location in Kailua Kona, Hawaii, that is only about 33 miles from the Hilo, Hawaii, VLBA site, but, according to Commission records, this permit expired on December 15, 1991; and (3) Louis Martinez was authorized to construct an LPTV station on Channel 38 (K38CS) at a location in Mammoth Lakes, California, that is about 48 miles from the Owens Valley, California, VLBA site, but according to Commission records, this call sign has been deleted. See Television & Cable Factbook, 1992 Edition, Stations Volume No. 60 (containing data updated to Oct. 1, 1991).

is being used by radio astronomers are reflected neither in the Commission's rules nor in Commission records or data bases. Of course, insofar as LPTV stations are concerned, the Channel 37 protection problem goes beyond a lack of awareness as to the location of radio astronomy sites because, even if an LPTV applicant knew these locations, the Part 74 rules require LPTV stations to protect UHF-TV stations in terms of their Grade B contour; radio astronomy sites do not have Grade B contours.

Thus, as set forth in the next section, CORF proposes that the Commission implement more effectively the adjacent channel protection to which radio astronomy sites using Channel 37 are entitled by: (1) incorporating into Part 73 of the Rules the locations of thirteen radio astronomy sites that currently make use of 608-614 MHz band; (2) deleting Channel 38 at Hilo, Hawaii, from the Table of Allotments; and (3) amending Part 74 of the Rules so as to provide for protection of Channel 37 in terms of a mileage separation requirement.

II. PROPOSED RULE CHANGES

First, CORF proposes that Rule Section 73.603(c) be amended by adding the following sentence at the end thereof:

(c) . . . Radio astronomy sites utilizing Channel 37 shall be treated as television broadcast stations for purposes of the adjacent channel protection set forth in Sections 73.610(c)(1) and 73.698.

Second, CORF proposes that Rule Section 73.606 be amended by adding a new subparagraph (c) to read as follows:

(c) Channel 37 is utilized at the following radio astronomy installations:

<u>Location</u>	<u>N. Latitude</u>	<u>W. Longitude</u>
(1) Arecibo, PR	18°-20'-46"	66°-45'-11"
(2) Socorro, NM (Very Large Array [VLA])	34°-03'-43"	107°-37'-04"
(3) Green Bank, WV (Green Bank Telescope [GBT])	38°-25'-59"	79°-25'-59"
(4) Pie Town, NM (Very Long Baseline Array [VLBA] site)	34°-18'-04"	108°-07'-09"
(5) Kitt Peak, AZ (VLBA site)	31°-57'-23"	111°-36'-45"
(6) Los Alamos, NM (VLBA site)	35°-46'-31"	106°-14'-44"
(7) Fort Davis, TX (VLBA site)	30°-38'-06"	103°-56'-41"
(8) North Liberty, IA (VLBA site)	41°-46'-17"	91°-34'-27"
(9) Brewster, WA (VLBA site)	48°-07'-52"	119°-41'-00"
(10) Owens Valley, CA (VLBA site)	37°-13'-54"	118°-16'-34"
(11) Saint Croix, VI (VLBA site)	17°-45'-31"	64°-35'-03"
(12) Hancock, NH (VLBA site)	42°-56'-01"	71°-59'-12"
(13) Mauna Kea, HI (VLBA site)	19°-48'-16"	155°-27'-29"

Third, CORF proposed that Rule Section 73.606(b) be amended by deleting the following allotment^{13/}:

	<u>Channel No.</u>
Hilo (Hawaii)	*38+

Finally, CORF proposes that Part 74 be amended by adding a new Rule Section 74.711 to read as follows:

§ 74.711 Radio astronomy protection.

An application to construct a new low power TV, TV translator, or TV booster station on Channel 36 or 38 or to change the facilities of an existing station on Channel 36 or 38 will not be accepted if it specifies a site which is within 87.7 kilometers (54.5 miles) of a radio astronomy facility listed in Section 73.606(c).

III. ADOPTION OF THE PROPOSED RULE CHANGES IS IN THE PUBLIC INTEREST

As noted above, the Commission made a public interest determination nearly 30 years ago that Channel 37 should be reserved for the Radio Astronomy Service. Inasmuch as the rule changes proposed herein are intended merely to implement more effectively that determination, there is no need for the Commission to make a new public interest determination in the context of this petition. The Commission simply has to determine that the current rules are not effectively providing the adjacent channel protection to which Channel 37 radio astronomy facilities

^{13/} CORF would have no objection to the substitution of a more suitable channel at Hilo. It should be noted that two other non-commercial allotments at Hilo, channels 4 and 32, are currently vacant. See Television & Cable Factbook, 1992 Edition, Stations Volume No. 60 (containing data updated to Oct. 1, 1991).

are entitled. Nevertheless, CORF explains below why adoption of the proposed rule changes is justified from a public interest standpoint.

A. Observations in the 608-614 MHz Band Are a Critical Component of Several Important Types of Astronomical Studies

The 608-614 MHz band has proven to be of great importance astronomically. For example, observations in that band are critical to the study of synchrotron radiation. Synchrotron radiation is radiation emitted over a wide range of frequencies by cosmic sources, or more precisely, by electrons traveling in spiral paths in a magnetic field. This is probably the most common form of cosmic non-thermal radiation. (Cosmic radio emission is used in astronomy to study the physical circumstances under which the radiation is generated, conditions that often cannot be reproduced in the laboratory.)

In the study of synchrotron radiation, observations at different frequencies are required to determine the distribution of electrons over a wide range of energies and to measure the rotation of the plane of polarization of the linearly polarized component of cosmic radio waves. Cosmic radio emission is often linearly polarized at its source, because it is excited by relativistic electrons in ordered magnetic fields. The radiation is influenced by magneto-ionic media (outer space and terrestrial ionosphere) on its way to the observer, causing the polarization vector to change orientation. Therefore, in order to clearly understand the intrinsic physical characteristics (e.g., magnetic

field strengths and plasma densities) of the cosmic source being studied, the change in polarization must be determined. The only way to do this is to make observations at a minimum of three not too widely spaced and not equally distant frequencies. Specifically, separation of observations by no more than one octave in frequency is essential in interpreting the data. The 608-614 MHz band is, therefore, of prime importance because it is situated to provide the octave steps between the 322-328.6 MHz (or 406.1-410 MHz) and the 1400-1420 MHz bands.

Another use of the 608-614 MHz band is in connection with Very Long Baseline Interferometry ("VLBI") observations. VLBI observations began in the 1970s and their importance and frequency increased steadily over the years. During the early development of the VLBI there was much emphasis on using the highest practicable frequencies to obtain the highest angular resolution. However, with the development of intercontinental baselines, the use of a wide range of frequencies has become important. Thus, observations of the 608-614 MHz band are being implemented at the Very Long Baseline Array ("VLBA"), which is now the primary VLBI array within North America. The VLBA is an array of 10 antennas distributed across the U.S. from Hawaii to the Virgin Islands. Computer processing of data recorded at each of the 10 antennas enables scientists to construct images equivalent in detail to those that would be obtained with a single 8,000-kilometer-diameter antenna.^{14/}

^{14/} In Europe, the 608-614 MHz band (there numbered Channel 38) is allocated to radio astronomy on a secondary basis and is an important feature of the European VLBI network. In India,

A third major use of the band is for the study of pulsars. In pulsars, the radio emission decreases rapidly with frequency, and observations are almost entirely confined to frequencies below 1.5 GHz. The 608-614 MHz band is therefore very important for such studies.

B. The Interference Protection Encompassed By The Proposed Rule Changes Is Very Limited In Scope And Would Not Pose an Unreasonable Burden on Broadcasters

As explained below, the interference protection encompassed by the rule changes proposed herein is very limited in scope and would not unreasonably burden either full- or low-power UHF-TV broadcasters.

First of all, under proposed Section 73.606(c), only the thirteen radio astronomy installations conducting studies in the 608-614 MHz band would be listed in the Table of Allotments. One of the thirteen sites is the Arecibo Observatory, which includes the world's largest radio/radar telescope and is part of the National Astronomy and Ionosphere Center, a federally-owned national research center. Because of its sensitivity, the Arecibo Observatory is a unique facility, capable of a wide variety of precise astronomical research. The second radio

where radio astronomy has a primary allocation, the band is most important for a new array under construction, the Giant Meter-Wave Radio Telescope near Pune. This will be one of the most powerful instruments in the world at meter wavelengths. Major instruments in other countries such as these will be linked to the U.S. VLBA for intercontinental VLBI observations during the next several decades. Protection from interference in the band is therefore of prime importance for the future of U.S. radio astronomy.

astronomy facility included among the twelve is the Very Large Array ("VLA"), an interferometer, which consists of 27 telescopes near Socorro, New Mexico. The VLA is the foremost interferometry radio telescope in the world. The third is the Green Bank Telescope (GBT), a 100-meter advanced design telescope, which is currently under construction and expected to be completed in 1995. The remaining ten other radio astronomy sites are part of the aforementioned VLBA, which will become operational in 1993.^{12/} Internationally, the Arecibo Observatory, the VLA, the GBT, and the VLBA guarantee a preeminent role for U.S. astronomy in centimeter wavelength studies. Also, the VLA currently operates 24 hours a day, year around, as will the other telescopes.

Second, ensuring that at least these thirteen radio astronomy sites are better protected against adjacent channel interference would not unreasonably burden either full- or low-power UHF-TV broadcasters because no existing broadcasters would be affected by these rule changes. CORF proposes grandfathering any existing or proposed, full- or low-power, UHF-TV stations on either channel 36 or 38 that are located within 54.5 miles of one of

^{12/} Arecibo Observatory is operated by Cornell University under a cooperative agreement with the National Science Foundation ("NSF"). Both the VLA and VLBA are operated by the National Radio Astronomy Observatory ("NRAO"). NRAO is a major National Research Center operated by Associated Universities, Inc. under a cooperative agreement with NSF. As previously noted, NRAO also operates the observatory at Green Bank, West Virginia, which is located in the National Radio Quiet Zone.

these radio astronomy sites.^{18/} However, as to any proposed stations, CORF would urge the Commission to consider requiring such applicants to amend their applications to specify a different channel if feasible. Also, as to any entities with outstanding construction permits, CORF proposes that such permittees be given grandfathered status only under their current permits. To the extent that such permits have expired (see, e.g., supra note 12), CORF proposes that such permittees should not have grandfathered status and that any extensions granted to such permittees be conditioned on using a different channel.

Third, as noted above, there are only a handful of locations where the Table of Allotments provides for Channel 36 or 38 allotments within the vicinity of one of these thirteen telescopes and, of these allotments, only one allotment, which is currently vacant, would be deleted. Potential licensees of another vacant allotment, Channel 36 at Davenport, Iowa, would be affected only to the extent that they would be precluded from locating a station within 54.5 miles of the North Liberty observatory, which is about that distance from Davenport anyway.

Fourth, since these radio astronomy sites are, for the most part, located in relatively remote, isolated areas and since the Part 74 rules give LPTV applicants the flexibility to propose use of any UHF channel between 14 and 69 (provided it meets the interference criteria), any LPTV applicant who wished to operate

^{18/} CORF proposes that the grandfathered status of such stations run to subsequent licensees or permittees as well provided that those stations make no change that results in increased power flux density at the radio astronomy station.

from a location within 54.5 miles of one of the affected radio astronomy sites would almost certainly have the ability to use a channel other than 36 or 38.

A final reason the proposed rules would not be burdensome to broadcasters is that broadcasters would not incur any expense in terms of modifying facilities by, for example, adding filters.^{17/} Rather, CORF is asking only that Channel 37 be treated the same as any other UHF-TV channel in terms of adjacent channel protection. Thus, the sole impact of the proposed rules would be that any broadcaster wishing to operate on Channel 36 or 38 would be required to locate its antenna at least 54.5 miles from a radio astronomy observatory utilizing Channel 37.^{18/}

IV. CONCLUSION

WHEREFORE, the foregoing premises considered, CORF urges the Commission to initiate a rule making proceeding to implement more effectively the adjacent channel protection to which radio astronomy sites using Channel 37 are entitled and to delete

^{17/} It should be noted that under CCIR Report 224-7, the recommended level to protect radio astronomy observations from harmful interference in the 608-614 MHz band is -253 dBW/m²/Hz.

^{18/} CORF wishes to emphasize that providing adjacent channel protection will not necessarily ensure that interference will not be caused to radio astronomy observations. Only compliance with CCIR Report 224-7 would be likely to ensure that interference will not be caused. The protection requested herein should be adopted because it will improve the level of protection afforded to the Radio Astronomy Service and because the Radio Astronomy Service is already entitled to this protection.

Channel 38 at Hilo, Hawaii, from the Television Table of Allotments.

Respectfully submitted,

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